

Amendments to the Drawings:

The attached replacement drawing sheet includes changes to FIG. 6E which has been amended to include reference numerals identifying layers 41, 42 and 43, and material 19.

REMARKS

Claim Status

Claims 1, 2, 6-11 and 13-23 have been examined. Claims 1, 2, 6-11 and 13-23 have been amended. The Specification has been amended. The set of drawings has been amended. No new matter has been added by way of this amendment. Reconsideration of the application is respectfully requested.

Objections to the Drawings

The drawings have been objected to under 37 CFR §1.83(a) and 1.84(p)(4). Specifically, the Examiner has stated that “the mirror layer 40 includes a plurality of different layers as recited in claim 7; the highly reflective layer 41, the protective layer 42 and a joining layer 43, as recited in claims 8-11; the electrically insulating material 19 as recited in claim 18 must be shown or the features(s) canceled from the claims”. In addition, the Examiner has stated “reference character 13 has been used to designate both p-type and mirror layer as showed in figure 6E”.

In response to these objections, Applicants have submitted amended Fig. 6E which has been amended to include reference numerals identifying layers 41, 42 and 43, and material 19. In addition, Applicants have amended the specification so that reference character 13 is used with reference to a p-type layer shown in Fig. 6E. Accordingly, entry of amended Fig. 6E to the present application is respectfully requested.

Objection to the Specification

The Specification has been objected to based on certain informalities. Specifically, the Examiner has stated that on “page 18, line 10, ‘p-conducting semiconductor layer 11’ should be changed to –p-conducting semiconductor layer 13—according to figure 6E”. In response to this

objection, Applicants have amended the specification in the required manner. Consequently, reconsideration and withdrawal of the objection to the specification are respectfully requested.

Patentability of the Claims Under 35 U.S.C. §102(a)

Claims 1, 6, 21-23 stand rejected under 35 U.S.C. §102(a) as being anticipated by U.S. Patent No. 6,531,719 ("*Shibata I*"). Applicants have carefully considered the Examiner's rejection, and the comments provided in support thereof, and respectfully disagree with the Examiner's analysis. For the following reasons, Applicants respectfully assert that all claims of the present application distinguish the invention patentably over the applied reference.

The present application discloses a semiconductor chip which emits electromagnetic radiation, having an epitaxially produced semiconductor layer stack based on a nitride semiconductor material, which includes an n-conducting semiconductor layer, a p-conducting semiconductor layer and an electromagnetic radiation generating region which is arranged between these two semiconductor layers. The chip also includes a base, on which the semiconductor layer stack is arranged, and a mirror layer which is arranged between the semiconductor layer stack and the base and reflects electromagnetic radiation emitted by the semiconductor layer stack in the direction of the base.

Shibata I relates to a "group III nitride compound semiconductor device comprising an undercoat layer having a surface on which a group III nitride compound semiconductor layer having a device function can be formed, [wherein] the surface of the undercoat layer contains inclined faces, [and] wherein the projected area ratio of the inclined faces to the whole surface of the undercoat layer on a plane of projection is in a range of from 5 to 100%" (see col. 1, line 65 thru col. 2, line 4 of *Shibata I*).

The Examiner contends the following:

With regard to claim 1, figure 11 of Shibata et al. discloses a semiconductor chip 50 which emits electromagnetic radiation having an epitaxially produced semiconductor stack (16, 17, 18) based on nitride semiconductor material, which includes an n-GaN layer 16, a p-GaN layer 18, and an electromagnetic radiation generating region 17 which is arranged between these two semiconductor layers 16, 18; a base layer (15, 11) on which the semiconductor stack (16, 17, 18) is arranged; and TiN mirror layer 25 which is arranged between the semiconductor layer stack (16, 17, 18) and the base layer (15, 11) and reflects electromagnetic radiation emitted by the semiconductor stack (16, 17, 18) in the direction of the base layer (15, 11); wherein the mirror layer 25 has ***a plurality [of] planar reflection sub-surfaces*** which are positioned obliquely with respect to a main plane of the radiation-generating region 17 ***and each form an angle between 10° and 50° with this plane.*** (Emphasis Added)

With respect to the foregoing statement, the following is noted. Contrary to the Examiner's contention, *Shibata I* fails to teach “planar reflection sub-surfaces ... [that are positioned to] ... form an angle of between 10° and 5° with respect to the main plane” of the radiation-generating region. Although *Shibata I* discloses an angle (see col. 2, lines 47-50), *Shibata I* only states that “the angle of incidence of light on the undercoat layer must be selected to be no larger than about 22°”. The angle of incident light provides no information with respect to the inclination of the textured structure of the undercoat layer. The incident angle of the reflected light is a function of both the inclination of the disclosed structure and the direction of light emissions from the light emitting layer. The direction of the light emissions based on this relationship is arbitrary. It is not a function of the angle of the undercoat layer with respect to any structure.

Moreover, Figs. 2 thru 4 and Fig. 9 of *Shibata I* only specify the lengths of the structures in the lateral direction. The vertical scale of these figures is not readily apparent. Therefore, it is not possible to measure an angle from these figures. Furthermore, schematic drawings 7, 8, 11 and 12 of *Shibata I* are clearly not true to scale. For example, the table at col. 8, lines 5-15 of

Shibata I states that the n-type layer 16 of Fig. 7 is nearly three times as thick as the undercoat layer 15. However, both layers are shown in Fig. 7 as having approximately the same thickness. Furthermore, it is well established that the drawings cannot be relied upon to show any specific dimensions.

It is respectfully submitted that *Shibata I* is silent with respect to inclination angles of the reflection sub-surfaces. If the Examiner continues to have a different position, then Applicants respectfully request that the Examiner enter into the Official record a clear explanation as to how the angles of inclination for the reflection subsurfaces set forth in Applicants' independent claim 1 were deduced from the *Shibata I* reference.

In view of the foregoing, *Shibata I* fails to teach the invention recited in amended claim 1. Consequently, reconsideration of the rejection under 35 U.S.C. §102(a) is in order, and a notice to that effect is earnestly solicited.

Patentability of the Claims Under 35 U.S.C. §103(a)

Claims 2, 7-11, 19 and 20 stand rejected under 35 U.S.C. §103(a) as being unpatentable over *Shibata I*, while claims 13-18 stand rejected under 35 U.S.C. §103(a) as being unpatentable over *Shibata I* in view of U.S. Patent No. 6,342,404 ("*Shibata II*"). For the following reasons, Applicants respectfully assert that all claims of the present application distinguish the invention patentably over the cited references.

Shibata II relates to "a method for producing a group III nitride compound semiconductor device, [wherein the method] comprises the steps of: forming a first environment division and a second environment division on a surface of a substrate; and laminating a plurality of group III nitride compound semiconductor layers for constituting a device on said first environment

division” (see col. 1, lines 42-48 of *Shibata II*). However, *Shibata II* fails to cure the above-discussed deficiency of *Shibata I*. Specifically, *Shibata II* also fails to teach “planar reflection sub-surfaces ... [that are positioned to] ... form an angle of between 10° and 50° with respect to the main plane” of the radiation-generating region, as recited in amended independent claim 1. In view of the foregoing, Applicants respectfully assert that amended independent claim 1 is patentable over the cited references. Therefore, reconsideration and withdrawal of the rejections under 35 U.S.C. §103 are respectfully requested.

Dependent claims

In view of the patentability of independent claim 1, for the reasons presented above, each of dependent claims 2, 6-11 and 13-23 is patentable therewith over the prior art.

Conclusion

Based on all of the above, it is respectfully submitted that the present application is now in proper condition for allowance. Prompt and favorable action to this effect and early passing of this application to issue are respectfully solicited.

Should the Examiner have any comments, questions, suggestions or objections, the Examiner is respectfully requested to telephone the undersigned in order to facilitate reaching a resolution of any outstanding issues.